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AUTOMATED CIRCULATION USING A DATA MANAGEMENT SYSTEM IN THE MED--ETC(U)
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AUTOMATED CIRCULATION USING A DATA MANAGEMENT SYSTEM
IN THE MEDIUM-SIZED TECHNICAL LIBRARY

DAVID W. TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER

Bethesda, Md. 20084



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AUTOMATED CIRCULATION USING A DATA MANAGEMENT
SYSTEM IN THE MEDIUM-SIZED TECHNICAL LIBRARY.

by

Shevra L. Martin

Final rept.

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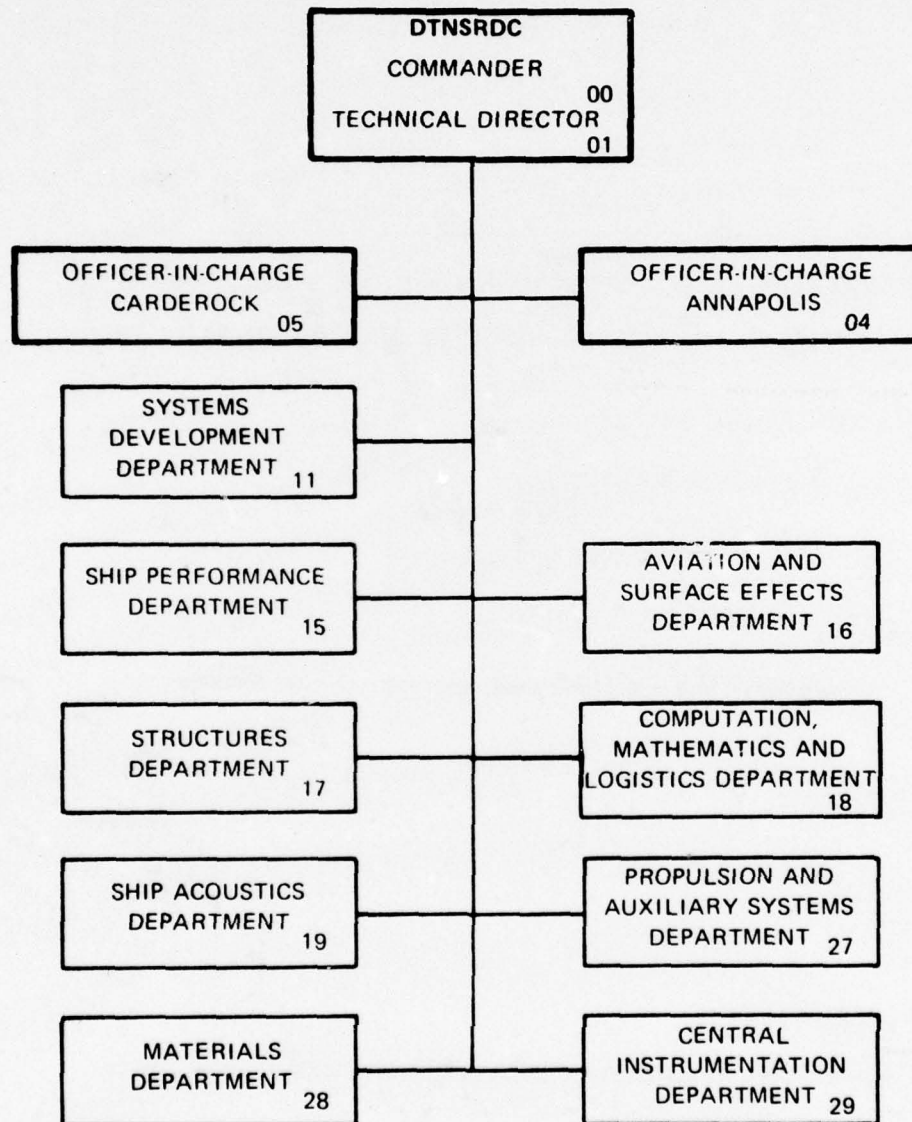
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individual borrowers holdings, and annual reminder notices to all borrowers listing their holdings. The system is described in terms of file creation, file maintenance, data retrieval, and report definition. A cost analysis is also presented.

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LIST OF ABBREVIATIONS

ADP	Automatic data processing
AUTH/ORG	Author/organization
DMS	Data management system
ILL	Inter-library loan
INDEF	Indefinite loan
ITEM/ID	Item identification
LEND/LIB	Lending library
LIBCRA	Library circulation, Annapolis
MR	Machine readable
OCR	Optical character recognition
REPT/NO	Report number
SHARP	Ships Analysis and Retrieval Program

ABSTRACT

LIBCRA, an automated circulation system developed for the David W. Taylor Naval Ship Research and Development Center Technical Information Libraries, utilizes the SHARP, Data Management System. The following output products are issued: listings of the entire file by author and borrower, inter-library loan records in chronological order of due-date, first and second overdue notices, lost materials records, lists of individual borrowers holdings, and annual reminder notices to all borrowers listing their holdings. The system is described in terms of file creation, file maintenance, data retrieval, and report definition. A cost analysis is also presented.

ADMINISTRATION INFORMATION

This work was performed under overhead. The principal investigator is Shevra L. Martin, Technical and Administrative Services Department, David W. Taylor Naval Ship Research and Development Center (DTNSRDC).

INTRODUCTION

Circulation systems can be roughly classified as either inventory control systems or absence systems. In inventory control systems, the Library's shelf list is converted into machine-readable (MR) form so that only borrower information is required at the time of the transaction. In absence systems, records are stored for materials only while they are absent from the collection. These MR records may be made either before, during, or after the transaction takes place.^{1*} The latter method, which the DTNSRDC Library employs, has the advantage of requiring neither on-site automatic data processing (ADP) equipment, nor advance preparation of publications.

When a user checks-out a publication, a brief manual record is made of the transaction. After the records batch-up, about once a week, the information is entered on the automated master file via optical character recognition (OCR) forms, key-punched cards, or keyboarding.

Prior to automated circulation, the Library used a manual two-card circulation system. Upon checking out a publication, the borrower would

* References are listed on page 18.

write his name and code (office mailing address) on two cards. The cards would be filed separately; one in an 'author file', the other in a 'borrower file'. Loans may be either short term or indefinite, depending on whether the material was borrowed from the Library's collection, or purchased specifically for departmental use with project funds.

The LIBCRA (Library Circulation) system provides the following capabilities:

- maintenance of a master file of circulation transactions with a two-week or longer due date
- quarterly production of two master file listings; one alphabetically by author, the other alphabetically by borrower
- management of inter-library loans (ILL's)
- automatic renewals and wait lists
- generation of first and second overdue notices
- records management for lost materials
- printing of individual holdings lists for borrowers
- production of annual remainder notices for borrowers with indefinite loans

THE DATA MANAGEMENT SYSTEM (DMS)

A generalized data management system available on the Center's CDC 6700 Computer System was selected. SHARP--Ship's Analysis and Retrieval Program--was developed at DTNSRDC in the COBOL procedural language. SHARP is designed to allow non-technical persons to define, build, maintain, and interrogate data bases without requiring application program interfaces.² While there are a variety of data base applications under the SHARP DMS, including technical document information retrieval, ship overhaul experience, computer center accounting, and Ocean Science Research Project Information, LIBCRA is the first such application for document circulation.

In the March 1975 issue of Special Libraries, Mr. K.A. Collins discusses the advantages of a DMS for Special Library use. SHARP and LIBCRA will be discussed in terms of Collins' four basic DMS categories:

- (i) file creation
- (ii) file maintenance
- (iii) data retrieval
- (iv) report generation

FILE CREATION

A SHARP user data base consists of one or more data files (LIBCRA uses only one file). Each file consists of a collection of logical records. Each logical record contains information which describes a different entity in the data file. In LIBCRA, each logical record represents a single circulation transaction.

The initial task in building the data base was to define the various elements that might occur in any one logical record. While there are fifteen possible LIBCRA data elements, the average record will use only five or six. The following is a brief explanation of each data element (each element acronym is preceded by its data element number).

0)RECORD KEY

Each record must have a unique descriptor which allows it to be distinguished from other records in the file. This record key is a serially assigned number from 1 to 9,999,999.

1)ITEM/ID

This is a numeric or alphanumeric code which uniquely identifies the circulating item, usually the LC call number or report accession number.

2)AUTH/ORG

This is the main entry.

3)TITLE

This may be entered in abbreviated form.

4) REPT/NO

The Report Number is optional and is used only when the Circulation Technician feels that it would help a user to identify a report should it be recalled.

5) BORROWER

To ensure standardization, the Center Telephone Directory is used as a guide for the proper entry of the borrower's name.

6) CODE

This is the office mailing address of the borrower.

7) DUE/DATE

This is used only for short-term (three-month) loans.

8) INDEF

This element, which can only have the value "INDEF", is used for departmental loans.

9) FORM

This optional element is used only for materials with an unusual form, such as film or kit.

10) ILL

The Inter-Library Loan notification can have either one of two values: an "L" for a publication loaned to another library, or a "B" for a publication borrowed from another library.

11) LEND/LIB

Used in conjunction with data element ten above, LEND/LIB identifies the source of the borrowed item.

12) LOST/INFO

The value "LOST" is entered into a record when the item is reported missing by the borrower.

13) RESERVE

This element may only have the value "RESERVE".

14)WAIT/LIST

This is a repeating element that can accommodate up to three names and codes and is only used if element thirteen is also used.

15)REMARKS

This element may be used for a Library staff member's message, such as to discard an old edition when returned, or to have it recataloged. Like WAIT/LIST, it is used only when element thirteen is used.

After defining the data base, the next step was to convert the information from our old file of borrowers cards into MAR form. In order to guarantee standardization in data entry, all entries were made according to precise instructions which were later incorporated into a user's manual.³

All conversion work was performed on an OCR machine. When conversion of older records began, we also started recording current transactions on the master file. When conversion was completed, both manual and automated systems were used simultaneously for a three-month trial period. During that time, the various reports were generated and edited and all query sequences were tested and debugged.

FILE MAINTENANCE

SHARP can be updated by adding records, changing or adding a data element within an existing record, or by deleting records. We use adds for entering new circulation transactions on the master file, changes for renewals, reserves, wait lists, etc., and deletes for removing records from the master file for returned materials.

Material is circulated from three points within the Library: the circulation desk, the inter-library loan desk, and the new accessions desk. Whenever material is circulated, information about the publication and the borrower is hand-written on a pre-printed form. Once a week, the information from these forms is copied on OCR forms and forwarded to the Computer Services Department for scanning. Since ILL records are so transient, they are entered on the master file directly at the terminal.

In order to delete a record from the master file for returned material, one need only enter the RECORD KEY preceded by "D" for delete. The RECORD KEY for the item is found by searching the Record Number Index (Figure 4) under the publication's ITEM/ID (LC call number or report accession number). Once deleted, a RECORD KEY may be re-used.

To renew an item for longer than the usual three-month loan period, one need only enter a "C" for change, the RECORD KEY, and the new due date preceded by its data element number.

Reserving material is more complicated. Since there are no borrowers cards in the automated system, the reserve notification appears on the Record Number Index in the Reserve column alongside the publication's ITEM/ID. When the Record Number Index is searched for a returned item's RECORD KEY, the reserve message will alert the Librarian not to reshelve the item. The reserver's name and code can then be looked up in the complete record for the transaction which appears in the Master File/Author Report (Figure 1). In order to enter reserve information in a record, one enters a "C" for change, the RECORD KEY, the word RESERVE preceded by data element number thirteen, and the reserver's name and code preceded by data element number fourteen.

Other changes, additions, and deletions to records are made by using one or a combination of these update commands.

DATA RETRIEVAL

Queries to the data base can be made either online at the terminal, or offline via a job control punched-card deck. Online queries may be entered in either an interactive or batch terminal mode. In the interactive mode, the user enters a query and monitors the job during the entire execution of a query job from query input to query output. In the batch terminal mode, the query is entered and then the user is asked to specify whether the query results (the number of hits, not to be confused with query output) are to be displayed online at the terminal or

to an off-line printer. The user then logs off the terminal and waits an average of 30 minutes before logging back on to receive the results.

For both the interactive and batch terminal modes, the system determines the number of hits for each question entered. The user then specifies whether or not the hit records should be printed on-line, off-line, or not printed at all.

Since most circulation queries have a large expected output and are not required for immediate use, they are usually submitted off-line via punched deck. With few exceptions, these query decks are submitted according to a pre-determined schedule.

REPORT GENERATION

All LIBCRA queries contain a report statement which identifies a previously defined report. Records selected in the search will then be output in one of five formats which were specified when the reports were defined.

MASTER FILE/AUTHOR REPORT

The Master File/Author Report is the most important listing for retrieval purposes. When a user identifies a title of interest in the catalog or new accessions bulletin which he cannot locate on the shelf, he searches the Master File/Author Report for the borrower's name and the due date. This Report consists of the entire master file in alphabetical order of main entry, title, and borrower. The query is submitted quarterly. See Figure 1.

MASTER FILE/BORROWERS REPORT

The Master File/Borrowers Report, Figure 2, lists the entire master file in alphabetical order of borrower's name, main entry, and title. It is used primarily in clearing employees who are checking-out of the Center. The query is submitted semiannually.

INDIVIDUAL LOAN TRANSACTIONS

A listing of Individual Loan Transactions, which is used for the same purpose as the Master File/Borrowers Report, is issued on a demand basis only. A search is made for all of the loan holdings of a particular borrower, and it reports the results by author's name and title. Since query output is small, the query may be submitted via punched deck or directly at the terminal in the online interactive mode. See Figure 3.

RECORD NUMBER INDEX

The Record Number Index, Figure 4, serves a dual purpose. First, it serves as a locator for RECORD KEYS for returned material. Second, it alerts the Librarian when an item had been previously reserved. The Index, which is in columnar form, lists the ITEM/ID's with their corresponding RECORD KEYS and, if applicable, reserve notifications. The report is generated monthly.

OVERDUE NOTICES

Both first and second overdue notices are sent monthly to delinquent borrowers. All short-term loans are due on the fifteenth of the third month from date of check-out. The overdue notices are issued on the thirtieth day of the third month from check-out date to allow a two-week "grace period". The queries search on DUE/DATE and report each borrower's overdues on a separate page with the mailing address at the top in memo format. See Figure 5.

According to Center Regulations, the Library is required to issue annual reminder notices to borrowers of indefinite loans. To accomplish this, a query is submitted at the year's end which searches for records with the value INDEF in data element eight that hadn't been recorded lost. The notice is similar in appearance to the overdue notices.

INTER-LIBRARY LOAN RECORD

Figure 6 is a sample page from the Inter-Library Loan Record. This weekly report is used for keeping track of all inter-library loan matters

including recalling loans from users by phone before they are due, recording renewals, etc. The query searches the master file for records in which the value "B" appears in data element ten. The results are arranged chronologically by due date and then alphabetically by borrower's name to facilitate recalls.

COST ANALYSIS

In attempting to provide a cost analysis, several mistakes in project management became apparent. First, monthly cost accounting worksheets which showed charges transferred from Library funds into Computer Services funds were sent to the Library budget manager instead of the Library automation project leader. Second, there was no way of differentiating between charges expended for regular operating costs, development costs, computer personnel labor costs, or the program users fee. To rectify this, separate funds have been established for each cost category.

Since we cannot break out the weekly accounting sheets by cost category, the cost analysis in Table 1 will suffice to show only projected annual operating costs based on averaging several typical months of operation.

CONCLUSION

In order to evaluate the success of the system, we must measure how well automation has enabled us to meet our goal of better control over the whereabouts of Library materials. To state this in quantifiable terms--is the number of first and second overdue notices sent each month and the number of items reported missing each month decreasing? Statistics will be kept for one year as part of an evaluation program.

In addition to better circulation control, automation has provided us with other advantages as well. Because of the large volume of indefinite loans out on circulation, it had never been feasible under the manual system to send annual reminder notices to borrowers of indefinite loans. The response to the first set of indefinite loan reminder notices issued

under the automated system has been enthusiastic. For the first time in the Center's eighty-year history, each employee received a list of all of the publications he had purchased. Many borrowers returned titles they no longer needed (and in many cases they had forgotten about), thereby putting hundreds of titles back in circulation.

Probably the greatest benefit derived from the project was in the area of staff development. During the system design phase of the project, the staff participated in flow charting and in determining the various data elements in the logical record. During data conversion, they received training in and became proficient in the use of the OCR and Key-punch machines. During the trial period, each staff member was responsible for editing and correcting her computer output, and for communicating problems directly to computer personnel. As part of daily operating procedures, staff members perform updates either directly at the terminal keyboard or via punched-deck, they merge and purge the holdings file at the terminal, and they submit queries and generate reports. In fact, the system is now totally operated and maintained by the Library staff without any intervention from the Supervisor.

After a successful experience with this relatively straightforward project, the Library staff is now prepared to embark upon another more complicated automation program, the development of a data bank of Library holdings with online retrieval capabilities.

ACKNOWLEDGMENT

The author wishes to acknowledge the assistance provided by Judith Lanham, Judith Fleming, and Suzanne Grabowski of the DTNSRDC Technical Information Library.

AUTHOR RECORDS

MASTER FILE OF CIRCULATION TRANSACTIONS

REPORT AUT UT 001

JUN 25 1976

RECORD

AUTH/ORG: AICHE
GVC/AICHE-JOINT MEETING AND/UND JAHRESTREFFEN...
BORROWER: WHITE E W 2831
TP 155.7 A 51V.3 INDEF

0007335

AUTH/ORG: AICHE
GVC/AICHE-JOINT MEETING AND/UND JAHRESTREFFEN...
BORROWER: WHITE E W 2831
TP 155.7 A 51V.4 INDEF

0007336

AUTH/ORG: AICHE
GVC/AICHE-JOINT MEETING AND/UND JAHRESTREFFEN...
BORROWER: WHITE E W 2831
TP 155.7 A 51V.5 INDEF

0007337

AUTH/ORG: AICHE
SAFETY IN HIGH PRESSURE POLYETHYLENE PLANTS
BORROWER: MC QUAID R W 2831
T 55.3 H 6 A 51V.1 INDEF

0005161

AUTH/ORG: AICHE
SAFETY IN POLYETHYLENE PLANTS
BORROWER: MC QUAID R W 2831
T 55.3 H 6 A 51V.1 INDEF

0005162

AUTH/ORG: AIR FORCE AERO PROPULSION LAB
ASSESSMENT OF POLLUTANT MEASUREMENT AND CONTROL...
BORROWER: HERSHNER C H 2705
U006087 INDEF
LOST

0003396

AUTH/ORG: AIR FORCE AERO PROPULSION LAB
FUEL DATA STANDARDIZATION STUDY FOR JP-4, JP-5...
BORROWER: VENTRIGLIO D R 2804
U015528 INDEF

0006993

AUTH/ORG: AIR FORCE AERO PROPULSION LAB
STUDY OF ESTIMATION METHODS FOR HYDROGEN CONTENT...
BORROWER: VENTRIGLIO D R 2804
U017184
DUE/DATE: JUN 15 76

0007695

Figure 1 -- Sample Page from Master File/Author Report
(Query UT in Report Format AUT)

BORROWER RECORDS

MASTER FILE OF CIRCULATION TRANSACTIONS

REPORT BWR WR 001

DEC 03 1975

RECORD

BORROWER: BOWEN R J 2724
AUTH/ORG: TYCO LABORATORIES INC
HYDROGEN-NICKEL REGENERATIVE FUEL CELLS
U015360 INDEF

0001756

BORROWER: BOWEN R J 2724
AUTH/ORG: WILSON
INTRODUCTION TO SCIENTIFIC R.S.
6123 INDEF

0000556

BORROWER: BOWEN R J 2724
AUTH/ORG: YARDNEY ELECTRIC CORP
EVALUATION OF IMPROVED SEPARATOR MATERIAL IN LARGE SILVER..
U013596 DUE/DATE: OCT 15 75

0001941

BORROWER: BOWEN T L 2721
AUTH/ORG: ATLANTIC RESEARCH CORP
HAZARDS OF LIQUID HYDROGEN IN RESEARCH AND...
U011237 INDEF

0000543

BORROWER: BOWEN T L 2721
AUTH/ORG: BUREAU OF MINES
REVIEW OF FIRE AND EXPLOSION HAZARDS OF FLIGHT...
U011514/C.2 INDEF

0000545

BORROWER: BOWEN T L 2721
AUTH/ORG: BUREAU OF MINES
REVIEW OF FIRE AND EXPLOSION HAZARDS OF...
U011514 INDEF

0000544

BORROWER: BOWEN T L 2721
AUTH/ORG: LITTLE ARTHUR D INC
FINAL REPORT ON AN INVESTIGATION OF HAZARDS...
U011239/C.2 INDEF

0000547

BORROWER: BOWEN T L 2721
AUTH/ORG: LITTLE ARTHUR D INC
ON AN INVESTIGATION OF HAZARDS ASSOCIATED...
U011240/C.3 INDEF

0000548

Figure 2 — Sample Page from Master File/Borrowers Report
(Query WR in Report Format BWR)

AUTHOR RECORDS

INDIVIDUAL LOAN TRANSACTIONS

REPORT AUT IDV001

AUG 05 1976

RECORD

AUTH/ORG: BAXTER
TEACH YOURSELF NAVAL ARCHITECTURE
BORROWER: GORE J L 1140
15623 INDEF

0002386

AUTH/ORG: BERANEK
NOISE REDUCTION
BORROWER: GORE J L 1140
12581 INDEF

0002388

AUTH/ORG: BULKLEY
AT CLOSE QUARTERS; PT BOATS IN THE U.S. NAVY
BORROWER: GORE J L 1140
D 773 B 81962C.3 INDEF

0007828

AUTH/ORG: BULKLEY
AT CLOSE QUARTERS; PT BOATS IN THE U.S. NAVY
BORROWER: GORE J L 1140
D 773 B 81962C.4 INDEF

0007829

AUTH/ORG: CHAPMAN
PILOTING, SEAMANSHIP AND SMALL BOAT HANDLING
BORROWER: GORE J L 1140
21707 INDEF

0002390

AUTH/ORG: DRUCKER
MANAGEMENT, TASKS, RESPONSIBILITIES, PRACTICES
BORROWER: GORE J L 1140
HD 31 D 791974C.2 INDEF

0002394

AUTH/ORG: DU CANE
HIGH-SPEED SMALL CRAFT
BORROWER: GORE J L 1140
VM 341 D 851972 INDEF

0002396

AUTH/ORG: FOX
SEAMANLIKE SENSE IN POWERCRAFT
BORROWER: GORE J L 1140
21760 INDEF

0002400

Figure 3 - Sample Page from Individual Loan Record
(Query IDV in Report Format AUT)

RECORD NUMBER INDEX

REPORT NOX DX 001

NOV 28 1975

ITEM ID	RESERVE	RECORD
QA 76 Y 811972		0001640
QA 76.5 D 231975		0002497
QA 76.6 D 131972		0001589
QA 76.8 I 12 B 871975		0001583
QA 807.08		0005076
QA 901.B 5		0005049
QA 901.C 8		0005041
QA 913 A 5121971C.2		0003242
QA 913 L 371972		0000776
QA 913 P 38C.2		0001900
QA 927. D 41960	RESERVE	0001935
QA 931.K 2313		0005083
QC 21.H 331V3PT1'		0005003
QC 225 H 15 C.3		0004005
QC 225 H 38V.1-AC.2		0001258
QC 244 H 581959		0001538
QC 244 V 5131967		0001283
QC 303 B 851965		0002082
QC 311.2 B 61 A 88		0004624
QC 311.2 E 38 A 88		0004626
QC 320 A 231974C.1		0002080
QC 320 A 231974C.2		0002166
QC 320.K 71973		0005048
QC 320.S 5VOL 1		0005042
QC 320.S 5VOL2		0005043
QC 355 B 619755TH		0002084
QC 371 O 611975C.2V.1		0001271
QC 371 O 611975V.2C.2		0001272
QC 381 N 971968		0001269
QC 401 G 211965		0002086
QC 45L K 681969		0003292
QC 670 S 81941		0002092
QD 117 C 5 T 721973		0002224
QD 169.W29 D 731968		0001236
QD 171 B 411972		0000202
QD 172 A 4 M 451967		0001645
QD 31 H 141969		0002440
QD 381 M 271972		0000174
QD 381 T 781970		0000175
QD 412 B 1 S 811964		0002929
QD 412 S 7 P 961970		0001822
QD 412 S 7 S 27 V.3 2SAWYER		0002257
QD 412 S 7 V.1		0002253
QD 412 S 7 V.2		0002255
QD 477 K 811966		0000649
QD 501 H 361971		0001536
QD 51 S 811971		0001555
QD 516 C 511972		0001232
QD 547 A 241973		0001693
QD 561.E 4		0005075
QD 65 H 1955THC.4		0001234

Figure 4 - Sample Page from Record Number Index
(Query DX in Report Format NDX)

*****LISTING OF OUTSTANDING LIBRARY MATERIAL*****

THE FOLLOWING OVERDUES SHOULD BE RETURNED TO THE LIBRARY.

TO RENEW A TITLE, BRING IT TO THE CIRCULATION DESK.

INDICATE HERE ANY LOST ITEMS AND RETURN FORM TO CODE 5222.

REPORT OVD FN 001

JUN 10 1976

BORROWER: SACK B P

DUE/DATE: JAN 15 76
AUTH/ORG: NTIS
MAGNETOHYDRODYNAMIC GENERATORS...
U015329

DUE/DATE: DEC 15 75
AUTH/ORG: WEBB INST OF NAVAL ARCH
FUEL CONSERVATION IN SHIP OPERATIONS
U014630

Figure 5 -- Sample First Overdue Notice
(Query FN in Report Format OVD)

RECORD OF INTER-LIBRARY LOANS
BORROWED FROM OUTSIDE LIBRARIES

REPORT DLB BLB001

JUN 04 1976

RECORD

0005022

DUE/DATE: JUL 02 76 UNMD
BORROWER: MONTEMARANO J A 2853
INTERFACE IN POLYMER MATRIX COMPOSITES VOL 6
AUTH/ORG: PLUEDDEMANN
CHEMTA 418.9.C 6 P 55
DEADLINE 28 JUNE 76

DUE/DATE: JUL 02 76 UNMD
BORROWER: MONTEMARANO J A 2853
STRUCTURE AND PROPERTIES OF ORIENTED POLYMERS
AUTH/ORG: WARD
CHEMQR 381.W 371975
DEADLINE 28 JUNE 76

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Figure 6 -- Sample Page from Inter-Library Loan Record
(Query BLB in Report Format DLB)

TABLE 1 - PROJECTED ANNUAL COST

(Figures are based on averaging the cost of
several typical months of operation)

<u>Purpose</u>	<u>Cost in dollars for Single Event</u>	<u>Estimated Number Events per Year</u>	<u>Cost in Dollars per Year</u>
<u>Updates</u>			
Interactive for ILL	15	52	780
Scans for batch jobs	15	52	780
<u>Queries and Reports</u>			
Individual loan holdings	4.25	60	255
First and Second Overdue Notice	30.15	12	361.80
ILL Record	4	52	208
Report Number Index	46	12	552
Master List/Author Report	129	4	516
Master List/Borrower Report	129	4	516
Reminder/Indefinite Loans	70	1	70
Lost Materials List	15	1	15
<u>Storage</u>			
	30	52	<u>1,560</u>
			Total per year 5,613.80

REFERENCES

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3. Martin, S.L., "LIBCRA: Library Circulation User Information Manual," David W. Taylor Naval Ship Research and Development Center Technical Information Libraries, Informal Note (Jun 1976).

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